Policy, Research, and External Affairs

WORKING PAPERS

Trade Policy

Country Economics Department
The World Bank
August 1990
WPS 485

Do Labor Market Distortions Cause Overvaluation and Rigidity of the Real Exchange Rate?

Ramón Lopez
and
Luis Riveros

Liberalization of the labor market would substantially reduce or prevent overvaluation of the real exchange rate.

Policy, Research, and External Affairs

WORKING PAPERS

Trade Policy

WPS 485

This paper — a joint product of the Trade Policy Division and the Macroeconomic Adjustment and Growth Division, Country Economics Department — is part of a larger effort in PRE to identify the role of labor markets in the process of economic adjustment in developing countries. Copies are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Raquel Luz, room N11-057, extension 34303 (32 pages, including tables).

Lopez and Riveros developed a theoretical model for analyzing the effect of labor markets on the real exchange rate. They applied an empirical version of the model to four Latin American countries with relatively different labor markets and macroeconomic conditions.

They found that distortions in the formal labor market are a major factor causing real wage rigidity and the low responsiveness of the real exchange rate to nominal devaluation.

They also found that changes in the minimum wage have substantially broader effects on an economy's wage structure than previously thought.

In other words, liberalization of the labor market could make exchange rate policies more effective by preventing overvaluation of the real exchange rate.

Do Labor Market Distortions Cause Overvaluation and Rigidity of the Real Exchange Rate?

by
Ramón López
and
Luis Riveros

Table of Contents

Comments on an earlier draft by Bela Balassa, Sonia Bhalotra, Ed Buffie, Arvind Panagariya, Claudia Sepulveda, and James Tybout, as well as the able research assistance of Larry Bouton and Isidro Scloaga, are deeply acknowledged. This research was financed by the Research Committee of the World Bank (RPO 679-30).

DO LABOR MARKET DISTORTIONS CAUSE OVERVALUATION AND RIGIDITY OF THE REAL EXCHANGE RATE?

1. Introduction

Many developing countries have a tendency toward overvalued exchange rates. Such overvaluation has contributed to serious current account imbalances that have necessitated "structural economic adjustments." In turn, an important component of structural adjustment has been devaluation of the nominal exchange rate, but the result has been mixed in many cases. In some countries, the responsiveness of the real exchange rate to the nominal devaluation has been relatively small. For example, for 14 devaluation episodes in Latin America, effectiveness (measured as the percentage change in the real exchange rate divided by the percentage change in the nominal exchange rate) one year after devaluation was found to be only 53%, substantially lower than the 74% average for the non-Latin American episodes (Edwards 1988).

Both the tendency to overvalue the exchange rate and the low responsiveness of the real exchange rate to a nominal devaluation have commonly been attributed to fiscal and monetary imbalances (Mussa 1986; Barandiaran 1988). If real fiscal expenditures and monetary balances are not sufficiently reduced after a devaluation, the real exchange rate is not likely to depreciate significantly (Edwards and Ahmed, 1988).

While in no way diminishing the evident importance of fiscal and monetary policies, this paper focuses on labor market distortions as another explanation for these two phenomena. Consider, for example, a small open economy in which the only distortion is a mandated minimum wage and in which open unemployment

prevails.[1] An increase in the real minimum wage will reduce both employment and real income. The supply of nontradables will fall in the short run (assuming that capital is sector specific). It will fall in the long run as well if production of non tradables is more labor intensive than production of tradables. At the same time, the fall in real income and the ensuing reduction in expenditures will reduce the demand for nontradables. So the net effect on the real price of nontradables is ambiguous. If the negative supply effect is strong, the price of nontradables will increase and hence, the real exchange rate will appreciate.

This appreciation of the exchange rate may imply "overvaluation" if it is associated with a worsening of the current account. If the increase in the real minimum wage is perceived as temporary, its effect on the current account is likely to be negative. The fall in real aggregate expenditures will be less than the fall in real income as consumers choose to spread the implied reduction in expenditures over time. Since the current account is the difference between aggregate expenditures and income, a higher real minimum wage is likely to cause its deterioration. In other words, a current account imbalance is generated that is caused by real forces rather than by monetary and fiscal policies.[2]

In our example, an increase in the minimum wage is likely to cause overvaluation of the real exchange rate and external imbalances, but would not affect the responsiveness of the real exchange rate to a nominal devaluation. In the real world, however, labor market distortions are far more complex than

---

1/ See Dixit and Norman (1980), and Neary (1978) for an analysis of the implications of economy-wide wage distortions in a trade model with money.

2/ Of course, the current account deficit brings about the well-known self-correcting mechanisms associated with the fall in foreign reserves, which eventually lead to a realignment of the exchange rate. The problem is that by the time this self-correcting process is completed, the country has lost considerable reserves and/or its external debt has risen.

an economy-wide mandated minimum wage. In many developing countries, unionization and government intervention are responsible for greater distortions. This intervention normally affects wage setting only in the formal sector of the economy, because the extreme atomization of firms makes unionization and enforcement of government regulation very difficult in the informal sector.

In a world in which unions and the government are partly responsive to market conditions, the size of the wage distortion that results in the formal sector (the premium between the actual and the notional or market clearing wage) may be endogenous and dependent on variables such as relative prices, real income, and the like. The premium increases with increasing unions' market power, but it does not necessarily become less responsive to changes in market conditions. Whether this premium becomes less sensitive in response to changes in market conditions as labor markets become more distorted is an important question. The effectiveness of a nominal devaluation as an instrument for inducing a real devaluation decreases as distortions in the labor market increase if, as a result, the wage premium becomes less responsive to market conditions.

In considering the consequences of labor market distortions for the real exchange rate, this paper explores two hypotheses: (1) an increase in labor market distortions leads to an appreciation of the real exchange rate, and (2) labor market distortions diminish the elasticity of response of the real exchange rate to a nominal devaluation. We evaluate the quantitative importance of the first hypothesis and parametrically test the second hypothesis for the case of four Latin American countries, namely, Argentina, Chile, Colombia, and Uruguay. In doing this we exploit what is largely an original data set for labor market variables constructed from primary country data sources.

We first present the conceptual model, and then conduct a comparative static analysis to help interpret the empirical results. The estimating model

and results are then discussed, followed by the major conclusions. Our findings generally support the hypothesis that istortions in the formal labor market are a major factor explaining wage rigidity and the relatively small responsiveness of the real exchange rate to a nominal devaluation.

2. The Conceptual Model

The model considers two sectors: (1) the formal sector, which is subject to unionization and government regulations and uses both skilled and unskilled workers, and (2) the informal sector, which is not subject to unionization, is de facto free from government regulations (including the minimum wage) and uses only unskilled workers. Because of the distortions in the formal labor market, open unemployment prevails among skilled workers. The equilibrium wage in the informal sector is assumed to be below the minimum wage. It is assumed that skilled workers do not accept working in the informal sector for a lower wage but wait for an opening in the formal sector. In contrast, unskilled workers move between the sectors. No distortions exist in the informal sector so wages are fully flexible. Since unskilled workers unable to find a job in the formal sector at the ongoing minimum wage are willing to work in the informal sector, there is no unemployment among unskilled workers.[3/]

In the formal sector, the wage rate for unskilled workers is equal to the minimum wage rate while the actual wage for skilled labor is assumed to be determined by a premium over a notional or market clearing wage. The model allows for change in this premium according to existing market conditions and government regulations. For unskilled labor, the relationship between formal

---

3/ Open unemployment in Latin America is largely a middle-class phenomenon. The typical unemployed person is relatively well educated, young and dependent, and waiting for a job opening in the formal sector (World Bank 1988).

and informal labor markets follows Harberger (1971): in the formal sector, the demand curve for unskilled labor and the minimum wage together determine employment. There is an effective labor supply to the informal sector that is less than the total supply of unskilled labor by the amount of employment in the formal sector. The market equilibrium between labor demand from the informal sector and the effective labor supply to the informal sector determines the informal sector equilibrium wage rate.

The price of nontradables is assumed to be determined by market clearing conditions, while the price of tradable goods is determined by the world price times the nominal effective exchange rate. The real exchange rate is thus the relative price of tradables to nontradables. This economy, then, has three endogenous prices: the actual wage for skilled workers, the wage for unskilled workers in the informal sector, and the price of non-tradables. We shall now, in turn, specify the determination of each of these prices.

2.1 Wage Determination in the Formal Sector

The formal market for skilled workers can be characterized by two equations. The first one corresponds to the determination of the notional market clearing wage rate:

$$(1) \quad \alpha_0 + \alpha_1 \ln p - \alpha_2 \ln w^* - \alpha_3 \ln mw + \alpha_4 \ln t = \mu N .$$

The left-side is the notional demand function for skilled labor, where p is the price of nontradable goods, w^* is the notional market clearing wage rate for skilled workers, and mw is the minimum wage rate. Each of the three variables is normalized by p_T, the price of tradables. The variable t represents other

factors affecting labor demand such as the capital stock, technical change, etc. The right-side of the equation corresponds to the (fixed) supply of skilled labor, where N is the labor force, and $0 < \mu < 1$ is a coefficient indicating that the supply of skilled workers in the short-run is a fixed proportion of the labor force. All the α_i coefficients are assumed to be positive. The notional demand for skilled labor is increasing in p and t, and decreasing in w^* and mw. The negative effect of mw on the demand for skilled workers reflects gross complementarity between skilled and unskilled labor in the formal sector.

The second equation corresponds to the determination of the actual wage rate for skilled workers. This wage is assumed to be equal to the notional market clearing wage rate plus a variable premium reflecting union and government intervention. Thus, the actual wage rate for skilled labor (w) is

$$(2a) \quad \ln w = \ln w^* + \pi(w^*, mw, \theta) ,$$

where $\pi(\cdot)$ is the variable mark-up or premium, which depends on the notional (equilibrium) wage (w^*), the minimum wage (mw) and $\theta \geq 0$, a variable reflecting other labor market distortions that affect the market for skilled labor. It can be shown that equation (2a) is consistent with a model of oligopolistic trade unions where each union maximizes a quadratic utility function having w/w^* and the union's membership as arguments subject to an aggregate labor demand curve. In this case, the variable θ has a natural interpretation which is the average degree of market power of the various unions.[4/] This specification is in turn

---

4/ It is assumed that there are N labor unions in the various industries. Union i maximizes a utility function $U[w/w^*, Li]$ subject to an inverse labor demand function $w = w(L, p, mw)$. The first order conditions are derived for each union allowing for non-zero conjectural variations. Adding up the first order conditions for all the unions, assuming that the quadratic utility has no inter active terms between w/w^* and Li and that

a generalization of the fixed mark-up case derived from a monopolistic trade union model by Calvo (1978).

We specify the following function for the mark-up

$$(2b) \quad \pi(\ ) = \theta \cdot (\epsilon_0 + \epsilon_1 \ln w^* + \epsilon_2 \ln mw) \ .$$

Thus, combining 2a and 2b we obtain an expression for the actual formal sector wage rate for skilled labor:

$$(2c) \quad \ln w = \ln w^* + \theta \cdot (\epsilon_0 + \epsilon_1 \ln w^* + \epsilon_2 \ln mw) \ ,$$

All ϵ_i (i=0,...2) coefficients are fixed. It is assumed that $\epsilon_0 > 0$; $(\epsilon_0 + \epsilon_1 \ln w^* + \epsilon_1 \ln mw) > 0$; $\epsilon_2 \geq 0$; the sign of ϵ_1 is not a priori determined; and $\theta\epsilon_1 > -1$. The latter condition implies that an expansion of labor demand (and, hence, a reduction in unemployment) will necessarily lead to higher notional and actual wages. That is, specification 2c implicitly allows for a relationship between real wages and unemployment.[5/]

Specification 2c has several interesting features: if $\theta = 0$ (i.e., there are no labor market distortions affecting the skilled labor market)[6/] then $w = w^*$; that is, the actual wage rate will coincide with the equilibrium wage rate.

---

it is identical across unions one can derive an expression for the wage equation such as 2a. The variable θ is the weighted average of the unions' conjectural variations using as weights the share in total employment of each union's employment level.

5/ Also note that by including w^* as a determinant of the wage premium we are implicitly allowing for this premium to be dependent on the level of unemployment. As the market clearing wage falls, ceteris paribus, unemployment increases.

6/ It is assumed that the minimum wage is below the notional wage rate for skilled workers.

Second, the actual wage rate is increasing in w^* and θ; that is, the actual wage rate is responsive to changes in market conditions (reflected by changes in w^*) and increases as the distortion θ increases. Third, the sensitivity of the actual wage rate to changes in the notional wage rate w^* is affected by the level of the distortion θ. The effect of θ on the responsiveness of w to changes in w^* depends critically on the parameter ϵ_1.[7/] If $\epsilon_1 > 0$, w becomes more responsive as labor markets distortions increase; $\epsilon_1 = 0$ implies no effect; and $\epsilon_1 < 0$ signifies that w become more rigid as the labor market distortions increase. And finally, if $\epsilon_1 = \epsilon_2 = 0$, equation 2 collapses into $w = e^{\epsilon_0 \theta} w^*$, in which case the markup is fixed and proportional to the level of distortion θ. This is a special case in which the markup is effectively independent of the demand conditions that determine the value of w^*.

Note that the specification 2c implies that unions maximize a utility function dependent on the proportional rent represented by the ratio of actual to notional wages as well as on the level of union employment. The advantage of using the proportional rent specification is that it is valid for any wage deflator provided both w and w^* are deflated by the same price. Hence this makes the distinction between "consumption" and "production" wages unnecessary.

Including the minimum wage in the markup represents the idea that the minimum wage signals to wage negotiators the degree of support the government provides to workers. So an increase in the minimum wage, even if it is much lower than the actual wage paid to skilled workers, is a positive signal encouraging labor organizations to be more demanding. If this signalling effect is important, we would expect $\epsilon_2 > 0$.

7/ From expression 2b one obtains $\partial \ln w / \partial \ln w^* = 1 + \theta \epsilon_1$, where the left hand side is interpreted as the responsivenes of actual to notional wages. Hence this responsiveness is affected by θ, the level of this effect being equal to ϵ_1.

Using equation 2c, we can express equation 1 in terms of observable variables as follows:

$$(3a)\quad \ln w = A_0 + A_1\theta + A_2 \ln p + A_3\,\theta \ln p + A_4 \ln mw + A_5\,\theta \ln mw + A_6 N + A_7\,\theta N + A_8 \ln t + A_9\,\theta \ln t$$

where $A_0 = \frac{\alpha_0}{\alpha_2}$ $\quad A_1 = \frac{\alpha_0}{\alpha_2}[\epsilon_1 + \epsilon_0 + \epsilon_2]$

$A_2 = \frac{\alpha_1}{\alpha_2}$ $\quad A_3 = \frac{\alpha_1}{\alpha_2}\epsilon_1$

$A_4 = -\frac{\alpha_3}{\alpha_2}$ $\quad A_5 = \epsilon_2 - \frac{\alpha_3}{\alpha_2}\epsilon_1$ $\quad A_8 = \frac{\alpha_4}{\alpha_2}$

$A_6 = -\frac{\mu}{\alpha_2}$ $\quad A_7 = -\frac{\mu\epsilon_1}{\alpha_2}$ $\quad A_9 = \frac{\alpha_4}{\alpha_2}\epsilon_1$

This set of coefficients allows us to determine the values of ϵ_0, ϵ_1, and ϵ_2 using the estimated A_i ($i = 0, \ldots 9$) coefficients. For example, the value of the coefficient $\epsilon_1 = A_3/A_2$ and its standard error can be estimated from the standard errors and covariances of A_3 and A_2 (Kendall and Stuart, 1977). We note that not all coefficients in equation (3a) are independent. In particular, the structural model (equations 1 and 2) suggests that $A_7/A_6 = A_3/A_2 = A_9/A_8$. This restriction is used in estimating the model and is statistically tested using non-linear methods.

2.2 Wage Determination in the Informal Sector

In contrast with the labor market for skilled workers, the market for unskilled labor is assumed to be permanently in equilibrium, and the supply of unskilled workers is assumed to be elastic,

$$(4a)\quad \beta_0 + \beta_1 \ln p - \beta_2 \ln w_u - \beta_3 \ln mw + \beta_4 \ln w + \beta_5 \ln t = \Omega_0 + \Omega_1 \ln \tilde{w}_u - \Omega_2 \ln p + \Omega_3 N ,$$

where the left-side represents the total demand (from both the formal and informal sectors) for unskilled workers and the right-side is the supply. The variable w_u is the wage rate for unskilled workers in the informal sector normalized by the price of tradables and $\tilde{w}_u$ is the "consumption" wage defined as $W_u/p_T^b\, p_N^{1-b}$ where b is the share of tradable goods in the consumption deflator of unskilled workers and W_u is the nominal wage for unskilled labor. Since the minimum wage is enforced in the formal sector, demand for unskilled labor in this sector is determined largely by the level of the minimum wage. In the informal sector, however, the minimum wage is not enforced and so the wage rate of unskilled workers in this sector, w_u, adjusts to clear the market. The supply of unskilled workers is assumed to be elastic ($\Omega_1 > 0$ is probably quite large) and dependent on the total size of the labor force N.[8/]

Using the definition of the "consumption" wage $\tilde{w}_u$, we can rewrite equation (4a) as,

$$(4b)\quad \beta_0 + [\beta_1 - \Omega_1 (b-1)] \ln p - \beta_2 \ln w_u - \beta_3 \ln mw + \beta_4 \ln w + \beta_5 \ln t = \Omega_0 + \Omega_1 \ln w_u - \Omega_2 \ln p + \Omega_3 N$$

From 4b we obtain the following specification for the wage rate of unskilled workers:

8/ Note that one can also allow mw to affect the supply of unskilled labor. However, this does not change the estimating, reduced-form specifications.

$$(5) \quad \ln w_u = B_0 + B_1 \ln p + B_2 \ln w + B_3 \ln mw + B_4 N + B_5 \ln t$$

where $B_0 = \frac{\beta_0 - \Omega_0}{\beta_2 + \Omega_1}$; $B_1 = \frac{\beta_1 + \Omega_2 - \Omega_1 (b-1)}{\beta_2 + \Omega_1}$

$B_2 = \frac{\beta_4}{\beta_2 + \Omega_1}$; $B_3 = - \frac{\beta_3}{\beta_2 + \Omega_1}$ $B_4 = - \frac{\Omega_3}{\beta_2 + \Omega_1}$.

$B_5 = \frac{\beta_5}{\beta_2 + \Omega_1}$,

Of course, the structural parameters of equation 4 cannot be determined from equation 5.

2.3 Determination of the Price of Non-Tradables

Finally, the market for nontradables is also assumed to be in equilibrium,

$$(6) \quad \gamma_0 + \gamma_1 \ln p - \gamma_2 \ln w - \gamma_3 \ln mw - \gamma_4 \ln w_u + \gamma_5 \ln t$$
$$= z_0 - z_1 \ln p + z_2 \ln(E/p_T)$$

where E is nominal absorption and $p_T = ep^*$, where e is the effective nominal exchange rate and p^* is the world price of tradables. The left-side of equation 6 represents supply, and the right-side the demand for nontradables. That we control for absorption in equation 6 means that the parameters will reflect the pure effect of labor market factors and exclude the indirect effects taking place via the adjustments in absorption induced by changes in labor market conditions. Of course, in the estimation we recognize the endogenous character of absorption by using the instrumental variables technique.

We can thus obtain from (6) an equation for the relative price of nontradables (the inverse of the real exchange rate), i.e.,

$$(7) \qquad \ln p = C_0 + C_1 \ln w + C_2 \ln mw + C_3 \ln w_u + C_4 \ln(E/p_T) + c_5 \ln t,$$

where $C_0 = z_0 - \gamma_0$ $\qquad C_1 = \dfrac{\gamma_2}{\gamma_1 + z_1}$

$C_2 = \dfrac{\gamma_3}{\gamma_1 + z_1}$ $\qquad C_3 = \dfrac{\gamma_4}{\gamma_1 + z_1}$

$C_4 = \dfrac{z_2}{\gamma_1 + z_1}$ $\qquad C_5 = \dfrac{\gamma_5}{\gamma_1 + z_1}$

3. Comparative Statics of the Model

Equations 1 to 7 can be used to determine to what extent distortions in the formal labor market may reduce the effect of a nominal devaluation on the real exchange rate. In particular, we are interested in how the effect of p_T on p is affected by the level of θ. Totally differentiating equation 7 with respect to p_T and explicitly accounting for changes in w and w_u using equations 3a and 5 yields:

$$(8a) \qquad \frac{d\ln p}{d\ln p_T} = - \frac{C_4}{1 - A_2C_1 - B_1C_3 - A_2B_2C_3 - A_3\theta\,(C_1 + C_3B_2)} < 0 .$$

Expression 8a measures the effect of a nominal devaluation on the (inverse) real exchange rate. The sign of expression 8a is negative given that C_4 is positive and that stability requires that the denominator be positive. This expression clearly shows that the impact of a change in p_T on the real exchange rate is affected by the extent of distortions in the formal sector (measured by

the size of θ). From 8a we can derive the effect of θ on the responsiveness of the real exchange rate to devaluation,

$$(8b) \qquad \frac{d\ln\ (d\ln\ p/d\ln\ p_T)}{d\ln\ \theta} = \frac{A_3\theta\ (C_1 + C_3\ B_2)}{H}$$

where $H > 0$ is the expression in the denominator in equation (8a).

Given $(C_1 + C_3B_2) > 0$, the effect of θ on the value of equation 8a depends crucially on the sign of A_3, which itself is equal to the sign of ϵ_1 (from the definition of A_3 in equation 3). So, if $\epsilon_1 > 0$, the effectiveness of a devaluation increases with θ; if $\epsilon_1 = 0$, the degree of labor market distortion has no influence on the effectiveness of a devaluation; and if $\epsilon_1 < 0$, the effect of a nominal devaluation declines with the size of θ. Intuitively, one might expect labor market distortions to affect not only the level but also the flexibility of real wages in response to changes in market conditions. If distortions cause real wages in the formal sector to become more rigid, then the real price of nontradables will also become more rigid and the real exchange rate would be less responsive to a nominal devaluation.

The effect of labor market distortions on the <u>level</u> of the real exchange rate can be obtained by totally differentiating equations 3, 5, and 7,

$$(9) \qquad \frac{d\ln\ p}{d\theta} = \frac{1}{H}\ [(A_1 + A_3\ \ln\ p + A_5\ \ln\ mw + a_7\ N + A_9\ \ln\ t)\ (C_1\ + C_3\ B_2)] > 0$$

The sign of expression 9 depends on the numerator, which is simply the effect of θ on the wage rate of skilled workers. This effect is obviously positive. Accordingly, a lessening of labor market distortions in the formal sector causes a depreciation in the real exchange rate. Based on the estimated coefficients,

equation 9 provides an expression to measure the quantitative importance of the effect of distortions in the skilled labor market on the (inverse) real exchange rate.

Similarly, by differentiating the system of equations 3, 5, and 7 with respect to ln p and ln mw we can obtain the effect on the real exchange rate of a change in the minimum wage,

$$(10) \quad \frac{d\ln p}{d\ln mw} = \frac{1}{H}\left[C_2 + C_1\ (A_5\theta + A_4) + C_3\ (B_3 + (A_5\theta + A_4)\ B_2)\right] > 0\ .$$

Raising the real minimum wage leads to an appreciation of the real exchange rate. The unambiguity of expression 10 arises from the fact that aggregate expenditures (E/p_T) are taken as given. Thus, expression 10 captures only the supply effects on nontradables associated with the direct effects of higher minimum wages plus the two indirect effects via higher wages for both skilled and unskilled labor. All these effects point toward a decrease in the supply of nontradables and so to an increase in their price. If one allows for endogenous expenditures, however, the effect becomes indeterminate if the higher minimum wage leads to a decrease in real income and, hence, of expenditures. Expressions 8a and 9 are also obtained for constant absorption. The interpretation of expressions 8a, 9, and 10 would then be the effect of a devaluation, changes in θ, and a change in mw, respectively, on the real exchange rate when the government uses fiscal and monetary instruments to keep absorption constant. This is consistent with the major objective of this paper, which is to isolate the role of labor characteristics in determining the effect of devaluation.

4. Empirical Estimation

The theoretical model implies a nonlinear restriction on the coefficients of equation 3a (i.e., $A_7/A_6 = A_3/A_2 = A_9/A_8$). A nonlinear method of estimation is thus needed to test for this restriction. The restricted form of the equation for skilled wages is the following:

$$(3b)\quad \ln w = A_0 + A_1\theta + A_2 \ln p + (A_2\epsilon_1)\,\theta \ln p + A_4 \ln mw + (\epsilon_2 + A_4\epsilon_1)\,\theta \ln mw + A_6 N + (A_6\epsilon_1)\,\theta N + A_8 \ln t + (A_8\epsilon_1)\,\theta \ln t$$

Equation 3b incorporates the restrictions that $A_3 = A_2\epsilon_1$, $A_7 = A_6\epsilon_1$ and $A_9 = A_8\epsilon_1$ as well as the definition $A_5 = \epsilon_2 + A_4\epsilon_1$. This allows us to directly estimate the key structural parameters ϵ_1 and ϵ_2 and their respective standard errors. We proceed by first estimating the unrestricted form (equation 3a) using linear two-stage least squares and then estimating the restricted form by a non-linear two stage least square method using the parameters of the unrestricted form as initial values.

Apart from the restriction presented above, the theoretical model implies sign restrictions on the estimating parameters that are empirically verified: $A_2 > 0$, $A_3 < 0$ (if $\epsilon_1 < 0$), $A_4 < 0$, $A_5 > 0$ (if $\epsilon_2 \geq 0$, $\epsilon_1 < 0$), $A_6 < 0$, and $A_7 > 0$ (if $\epsilon_1 < 0$), $A_8 > 0$ and $a_9 < 0$ (if $\epsilon_1 < 0$), while A_0 and A_1 have unrestricted signs. Furthermore, the expected sign pattern of the other estimating equations is the following: B_1, $B_2 > 0$; B_3, $B_4 < 0$; $B_5 > 0$; C_1, C_2, C_3, $C_4 > 0$; $C_5 < 0$; and B_0, C_0 are unrestricted. The estimation procedure also uses instrumental variables to account for the possible endogeneity of the variable θ in equations 3a and 3b and of the variable absorption (E/p_T) in equation (7).

Data

Equations 3a (or 3b), 5, and 7 were estimated separately for Argentina, Chile, and Colombia using annual data for 1960-85, and for Uruguay using data for 1965-85. Most of the labor market data used are original, constructed from primary data sources in each country.[9/] Wages in the informal sector were proxied by the average observed hourly income of self-employed workers with less than eight years of schooling.[10/] Wages of skilled labor were measured by the average wage of salaried blue-collar and white-collar workers in firms employing more than ten workers. Official statistics were used for the minimum wage and size of the labor force. The inverse real exchange rate (p) was defined as the ratio between the price index of nontradables and tradables. The price series were constructed using corresponding price deflators from national accounts. Agriculture, mining, and manufacturing were considered tradables; services, construction, and utilities were considered nontradables. The variable θ is not directly observable and thus we are forced to use an empirical proxy. We use the level of observed real nonwage labor costs per worker in firms with 10 or more workers (costs associated with payroll taxes including bonuses, fringe benefits, and other contributions to shared funds).

Nonwage labor costs were used as a proxy for labor market distortions other than the minimum wage because both government regulations and labor unions in the countries being considered have emphasized nonwage benefits as a prime target. For instance, in Argentina and Colombia, periods of more active union or government intervention have been characterized by higher non-wage payments;

9/ See appendix for a documentation of the data set and for a description of the historical experience of the four countries considered.

10/ This proxy is a suitable one in considering that the informal sector in LDCs consists fundamentally of very small firms, usually of the family-type, employing relatively unskilled labor.

on the contrary, under a military-conservative regime, Chile suffered a significant decline in non-wage benefits during the 1970s. Responding to pressures from unions and other influential coalitions, governments have at times expanded severance payments and other benefits -- and, in the process, increased acceptance for these policies by casting them as a concern for worker welfare. From the side of union's objectives, non-wage benefits are also considered a key variable in wage bargaining. The emphasis of unions on non-wage benefits derives in part from the non-taxable status that these benefits normally enjoy.11/

The validity of using nonwage benefits as a proxy for labor market distortions is supported by a detailed study of twenty developing countries that found nonwage benefits to be positively related to other qualitative indicators of labor market distortions (Riveros 1989). Countries in which nonwage costs were a small part of total labor costs (in 1985) were also generally regarded as having little government or union intervention, such as Chile (25%), Hong Kong (20%), Korea (20%), and Singapore (35%). By contrast, the share of nonwage costs were high in interventionists/unionized countries such as Argentina (46%), Mexico (45%), and Brazil (38%).

A possible objection to using labor market distortions as an explanatory variable is that this is a structural feature of an economy unlikely to change significantly. Fortunately, this is not the case for the countries under consideration, mainly due to the frequent institutional and political changes

---

11/ Non-wage benefits are nontaxable in all four countries considered, and this tax status did not change throughout the period. Therefore, the observed variability in θ through time cannot be attributed to changes in the tax laws.

that have taken place throughout the period under analysis.12/ This allows us to be confident that the important variability of real non-wage labor cost represents meaningful changes of distortions affecting the formal sector.

Estimates

The econometric estimates for the restricted and unrestricted versions of the equation for the wage rate of skilled workers are presented in Table 1, estimates of the equation for unskilled workers are shown in Table 2, and estimates of the price equation are presented in Table 3. The results in Table 1 exclude the variable t. This variable was supposed to account for the role of other factors on labor demand, such as capital and technological change. Suitable capital stock series for the countries under consideration are not available and thus we used a time trend variable. Unfortunately, the parameters associated with this variable were not statistically significant. A reason for this is that the dependent variables do not exhibit any defined trend through time due to the relatively high degree of instability that characterized the countries during most of the period under analysis.

The goodness of fit of the four estimated equations is highly satisfactory for all the countries, as shown by the high t-statistic values and other statistical measures. Some equations showed first-order autocorrelation, for

---

12/ In the case of Chile, for example, in the early 60s a conservative government gave little support to unions which is reflected in a relatively low level of non-wage benefits. In the second half of the 60s a new government took power, followed in 1970 by a three-year socialist experiment. In this period non-wage benefits showed a continuous upward trend peaking in 1972. The next three-year period shows a dramatic reduction in the index of non-wage costs that coincides with the early years of a right wing military regime. After 1978 until 1982 there is a gradual improvement of this index associated with new labor lagislation that reestablished some of the labor protection rules and that imposed backward wage indexation.

which we made the necessary corrections. We also tested for second order autocorrelation using Box-Pierce statistics, and in all cases could not reject the hypothesis of no second-order autocorrelation. We used a Chow test to determine whether any structural changes affected the parameter values throughout the sample period. We segmented our samples into subperiods on the basis of information on institutional changes and on major changes in the economic regime during the sample period.13/ In all cases, the Chow test allowed us to conclude that the parameters were stable during the period.

The sign pattern of the estimated coefficients is highly consistent with the expected signs derived from the theoretical model for three of the countries -- Colombia, Chile, and Uruguay. All the statistically significant coefficients estimated for these countries have the expected signs. The coefficients that were not statistically significant and that had the "wrong" signs were B_3 and B_4 for Colombia, C_1 for Chile, and A_4, B_4, and C_3 for Uruguay. The estimates for Argentina are substantially less consistent with the theoretical model, with three coefficients having significant values but wrong signs. These are A_2, A_4, and C_4 in the restricted model. The results are presented nonetheless so that the reader can get an unbiased report on the empirical relevance of the model. Among the possible reasons for this lack of consistency for Argentina are the following: Argentina suffered severe macroeconomic shocks and relative price instability during the sample period to a much greater extent than the other countries. Such an economic environment may be expected to make economic agents deviate from expected patterns and it increases the difficulties of constructing a consistent time series data set.

13/ In the case of Chile, for example, we tested for structural change during the conservative military regime (1974-85), in Colombia during the coffee boom (1975-80), in Argentina and Uruguay for the periods of military government (1974-1983 and 1973-1982 respectively).

The restriction on the coefficients of the skilled wage equation (equation 3b) suggested by the theoretical model was tested using a Wald test. The Chi-squared value of this test suggests that the restriction cannot be rejected at any reasonable level of significance in the cases of Argentina, Colombia, and Uruguay. For Chile, the restriction is rejected even though the unrestricted estimates come close to satisfying the theoretical restriction.[14/]

The structural parameters ϵ_1 and ϵ_2 are estimated from the restricted version of the skilled wage equation. There is a high degree of consistency on the signs of these coefficients among the four countries. The sign of ϵ_1 is negative in all cases and, according to the estimated asymptotic variance, significantly different from zero in Argentina, Chile, and Uruguay. This result suggests that in these countries the wages of skilled labor become less responsive to market conditions as the labor market becomes more distorted. In other words, increased government and union intervention not only pushes wages up (by increasing the markup) but also makes the wage level less responsive to changes in market conditions.[15/] Only in Colombia is wage rigidity not affected by labor market distortions.

It is important to indicate that this wage rigidity effect is not necessarily associated with government-imposed wage indexation. We allowed for the coefficient ϵ_1 to change during periods of official wage indexation using a dummy variable. The coefficient of the dummy variable was never significant in any of the countries suggesting that we are not measuring the obvious wage rigidity effect generated by direct government-imposed indexation.

14/ We nonetheless use the parameters of the restricted version in the ensuing analysis for Chile as well as for the other three countries.

15/ The estimates permit us to calculate the value of the markup on the bais of equation 2b. Evaluated at average values of the variables, this mark-up fluctuates between 23 percent for Chile and 69 percent for Argentina.

The coefficient ϵ_2 is consistently positive for all countries, and its significance is high for Argentina, Colombia, and Chile and borderline for Uruguay. This result implies that adjustments in the minimum wage have effects well beyond the relatively small segment of the labor force for which the minimum wage is binding. The signalling effect of minimum wages thus appears to be very important for wage negotiators in the formal sector.

These results have important implications for the exchange rate. First, in all the countries, except Colombia, increased government and union intervention in the formal sector labor market decreases the ability of a nominal devaluation (with constant money expenditures) to generate a real devaluation. Table 4 shows the effects of changes in θ on the effectiveness of devaluation, calculated using equation (8b) with the estimated parameters. The largest effect occurs in Uruguay and Chile, where a 10% increase in θ leads to a decrease in the effectiveness of devaluation (measured as the percentage change in the real exchange rate divided by the percentage change in the nominal exchange rate) by 7.6% and 5.8% respectively when evaluated at mean values. For Argentina the effect is smaller and for Colombia, consistently with the lack of significance of the ϵ_1 coefficient, the effect is almost negligible. It is interesting that the two countries where the effectiveness of devaluation is most affected by θ are precisely those that exhibit relatively milder distortions in the formal labor market. This might suggest that the marginal effect of increasing distortions in labor markets already highly distorted are of little importance for the effectiveness of devaluation but that even small increases of distortion in labor markets initially subject to a low level of distortions can be very significant.

Second, increasing real minimum wages cause a substantially greater appreciation effect on the real exchange rate than previously thought. For

example, using equation 10 evaluated at the mean value of θ, we find that a 10-percent increase in the minimum wage (without a nominal devaluation) causes the real exchange rate to appreciate 1 percent in Chile, 0.4 percent in Colombia, and 2.8 percent in Uruguay (Table 5). The estimates for Argentina in Table 5 give wrong signs. This is due to the sign problems for several coefficients discussed earlier. Note that increasing minimum wage causes the greatest appreciation of the real exchange rate in Chile and Uruguay, countries where the real minimum wage level is lower than in Argentina and Colombia.

In summary, the estimates for three of the four countries analyzed are highly consistent with the theoretical model presented in section 2. One should note, however, that the results of the comparative static experiments on the exchange rate are obtained by controlling for domestic absorption. Changes in minimum wages and distortions affecting the skilled labor market are likely to also affect absorption. Consideration of this latter effect may thus affect the quantitative significance of the results reported in this paper.

5. Conclusion

The main objective of this paper was to measure the importance of labor market distortions in explaining the marked tendency to real exchange rate overvaluation and the relatively low effectiveness of devaluation in Latin America. To do so, we developed an empirical model for analyzing the role of labor markets in the determination of the real exchange rate. This model was applied to four Latin American countries displaying relatively different macroeconomic and labor market conditions.

The main finding is that distortions in the formal labor market are a major factor explaining wage rigidity and the diminished responsiveness of the real exchange rate to devaluation. The implication is that greater liberalization

of the labor market can substantially improve the efficacy of exchange rate policies in preventing overvaluation of the real exchange rate. Another important finding is that changes in the minimum wage have substantially broader effects on the wage structure of the economy than previously thought. This, in turn, implies that continuous increases in the minimum wage are an important factor underlying the observed tendencies to overvaluation of the exchange rate in Latin America.

In summary, we have, to the best of our knowledge, presented the first parametric testing of two hypotheses that have been a source of continuous debate among policy analysts, namely, that labor market distortions cause wage and real exchange rate rigidity and that increases in minimum wages tend to push the entire wage structure upwards. Our findings generally support both hypotheses.

Table 1: NL2SLS Estimates of the Skilled Wage Equation

	Argentina (1960-85)		Colombia (1960-85)		Chile (1960-85)		Uruguay (1965-85)	
	Restricted[a]	Unrestricted[b]	Restricted[a]	Unrestricted[b]	Restricted[a]	Unrestricted[b]	Restricted[a]	Unrestricted[b]
A0 (Constant)	2.556 (2.553)	0.569 (0.634)	-2.344 (-2.788)	-3.730 (-2.531)	0.007 (1.171)	-6.348 (-1.600)	0.146 (0.207)	1.710 (1.000)
A1 (θ)	-3.337 (-2.423)	-0.864 (-0.755)	-0.411 (-0.578)	1.180 (0.778)	1.808 (1.771)	1.913 (0.761)	0.108 (0.363)	-1.100 (-0.918)
A2 (ln p)	-4.781 (-2.311)	-1.064 (-0.618)	3.961 (4.038)	(5.660) (3.199)	7.367 (3.047)	9.932 (1.717)	2.192 (2.032)	0.071 (0.030)
A3 (θ ln p)	--	2.188 (1.006)	--	-2.560 (-1.218)		-3.054 (-0.866)	--	0.424 (0.310)
A4 (ln mw)	4.759 (2.802)	2.401 (2.015)	-0.486 (-2.518)	-0.724 (-2.472)	-0.885 (-1.323)	-2.122 (-1.328)	0.609 (0.645)	1.900 (1.132)
A5 (θ ln mw)	--	-2.410 (-1.557)	--	1.123 (2.049)	--	0.853 (0.972)	--	-0.744 (-0.825)
A6 (N)	-1.225 (-2.982)	-0.826 (-3.457)	-0.087 (-2.461)	-0.160 (-2.204)	-0.803 (-4.283)	-0.536 (-1.703)	-1.934 (-3.187)	-2.695 (-2.610)
A7 (θN)	--	0.998 (2.571)	--	0.194 (1.275)	--	0.329 (1.669)	--	1.433 (2 050)
c_1	-1.416 (-22.286)	--	-0.077 (-0.348)	--	-0.351 (-4.222)	--	-0.408 (-8.988)	--
c_2	1.222 (5.830)	--	0.610 (2.352)	--	0.197 (2.629)	--	0.235 (1.572)	--
$\bar{R}^2$	0.76	0.95	0.97	0.96	0.92	0.94	0.95	0.93
DW	2.34	1.83	1.86	1.60	1.64	1.79	2.11	1.40
Chi-squared value of Wald test	0.474		1.80		15.739		0.001	
Level of significance	0.491		0.180		0.001		0.97	

a: Equation (3b).
b: Equation (3a).

Note: numbers in parentheses are t-statistics.

Table 2: ESTIMATES OF THE UNSKILLED WAGE EQUATION 1/
(Equation 5)

	Argentina*	Colombia	Chile*	Uruguay
B0 (Constant)	-0.187 (-0.908)	-0.931 (-1.075)	-1.129 (-1.872)	-0.349 (-0.403)
B1 (ln p)	0.029 (0.081)	1.010 (0.839	2.127 (2.408)	0.713 (0.516)
B2 (ln w)	0.717 (1.729)	0.693 (2.543)	0.347 (2.216)	1.341 (2.269)
B3 (ln mw)	0.204 (0.906)	0.183 (1.481)	-0.263 (-1.146)	-1.163 (-1.780)
B4 (N)	0.207 (1.098)	0.044 (0.770)	-0.081 (-0.499)	0.470 (1.128)
$\tilde{R}^2$	0.96	0.90	0.93	0.59
DW	2.7	1.6	2.5	1.3

1/ The sample period is 1960-85 for Argentina, Chile, and Colombia, and 1965-85 for Uruguay.

* corrected for first-order autocorrelation.

Note: Numbers in parentheses are t-statistics.

Table 3: ESTIMATES OF THE PRICE EQUATION 1/
(Equation 7)

	Argentina*	Colombia	Chile*	Uruguay
C0 (Constant)	1.686	0.931	80.932	0.478
	(2.390)	(15.018)	(0.734)	(17.910)
C1 (ln w)	0.267	0.076	-0.059	0.262
	(0.504)	(1.429)	(-0.866)	(3.564)
C2 (ln mw)	0.121	0.014	0.106	0.070
	(0.342)	(0.442)	(1.918)	(1.181)
C3 (ln w_u)	-0.876	0.044	0.228	-0.005
	(-1.144)	(0.586)	(2.175)	(-0.125)
C4 (ln E/p_T)	-0.183	0.079	0.060	0.191
	(-1.961)	(1.583)	(1.993)	(9.133)
$\bar{R}^2$	0.93	0.96	0.94	0.98
DW	2.4	2.2	2.3	0.99

1/ The sample period is 1960-85 for Argentina, Chile, and Colombia, and 1965-85 for Uruguay.

* corrected for first-order autocorrelation.

Notes: Numbers in parentheses are t-statistics.

Table 4: EFFECT OF DISTORTIONS IN THE FORMAL LABOR MARKET ON THE RESPONSIVENESS OF THE REAL EXCHANGE RATE TO DEVALUATION a/

	At Mean Value of the Variables	At the 1986 Values
Argentina	-0.12	-0.14
Colombia	-0.06	-0.05
Chile	-0.58	-0.42
Uruguay	-0.76	-0.51

a/ Calculated using equation (8b).

Table 5: EFFECT OF MINIMUM WAGES ON THE REAL EXCHANGE RATE b/

	At Mean Value of the Variables	At the 1986 Values
Argentina	-0.33	-0.11
Colombia	0.04	0.15
Chile	0.10	0.09
Uruguay	0.28	0.32

b/ Calculated using equation (10).

References

Barandiaran, E. (1988). "The Adjustment Process in Latin America's Highly Indebted Countries." The World Bank, Washington, D.C.

Calvo, G. (1978). "Urban Unemployment and Wage Determination in LDCs: Trade Unions in the Harris-Todaro Model," International Economic Review, vol. 19, no. 1, p. 65-81.

Corbo, V. (1986). "Problems, Development Theory and Strategies of Latin America," DRD Discussion Paper No. 190, The World Bank.

Corbo, V., and J. de Melo (1987). "Lessons from the Southern Cone Policy Reforms," The World Bank Research Observer.

Dixit, A., and V. Norman (1980). Theory of International Trade. Cambridge University Press, Cambridge, Mass.

Edwards, S. (1988). "Exchange Rate Misalignment in Developing Countries," World Bank Occasional Paper No. 2 (New Series). Washington, D.C.

Edwards, S., and L. Ahamed, eds. (1986). Economic Adjustment and Exchange Rates in Developing Countries. NBER Conference Report. Chicago: University of Chicago Press.

Edwards, S., and Alejandra Cox-Edwards (1987). Monetarism and Liberalization: The Chilean Experience. Cambridge, Mass.: Ballinger Publishing Company.

Harberger, A. (1971). "On Measuring the Opportunity Cost of Labor." International Labour Review" 130.

Kendall, M., and A. Stuart. (1977). The Advanced Theory of Statistics. New York: MacMillan.

Mussa, M. (1986). "The Effects of Commercial, Fiscal, Monetary and Exchange Rate Policies on the Real Exchange Rate." In Economic Adjustment and Exchange Rates in Developing Countries, Edwards & Ahamed, eds., Chicago.

Neary, P. (1978). "Non-Traded Goods and the Balance of Trade in a Neo-Keynesian Temporary Equilibrium," Quarterly Journal of Economics.

Riveros, L. (1989). "International Differences in Wage and Non-Wage Labor Costs." PPR Working Paper No. 19, Washington D.C.: World Bank.

World Bank. (1984). Colombia: Economic Development and Policy Under Changing Conditions. World Bank Country Study, Washington, D.C.

World Bank. (1988). Colombia: Country Economic Memorandum. Washington, D.C.

Data Appendix

The macroeconomic data were obtained from standard databases available at the World Bank (ANDREX and IFS). The estimation period is 1960-1985 for Argentina, Chile and Colombia, and 1965-85 for Uruguay (because of a lack of adequate information on some labor market variables for the earlier period). The price series of tradables and nontradables were constructed using corresponding price deflators taken from national accounts. For wage data, we used the country studies mentioned below. The skilled/unskilled classification was obtained using information on schooling years and job characteristics from labor force surveys. The definition of unskilled (informal) workers corresponds to own account workers with less than eight years of schooling; for Uruguay, data correspond to employed unskilled labor in general. The variable nonwage labor costs includes to fringe benefits, social security contributions, payroll taxes, and bonuses periodically included in the wage bill. The labor force and minimum wage variables come from official government statistics reported in the country studies mentioned below.16/

Argentina: Sanchez, C., and O. Giordano. "Exchange Rate Policies and the Structure of the Labour Market in Three Latin American Countries," IIERAL-Fundacion Mediterranea, Cordoba, January 1988.

Chile: Paredes, R. "Trends in Labour Market Variables and Macroeconomic Adjustment in Chile," University of Chile, Santiago, February 1988.

Colombia: Reyes, A. "Tendencias del empleo y la distribucion del ingreso," Bogota, June, 1986.

Uruguay: Ibarra, A.M., "Politicas Cambiarias y la Estructura del Mercado del Trabajo: Uruguay," Montevideo, October 1988.

16/ The World Bank hired local consultants in each country to prepare the data set used in this study. The four data reports are available upon request.

The countries included in this study are at relatively similar development stages, as suggested by similar life expectancies and primary school enrollment ratios. The share of manufacturing in GDP -- a rough indicator of the size of the formal sector of the economy -- is also similar. There is more variation in per capita GDP, but this is due more to periods of over and undervaluation of the dollar than to differences in key economic variables.

The four countries have used import-substitution development strategies since the 1940s, although Colombia partially abandoned this strategy in the late 1960s (World Bank 1984). As time passed, import substitution created progressively greater macroeconomic imbalances without improving wages or employment (Corbo 1986), resulting in considerable government intervention in goods and factors markets. The more obvious cases of this increased interventionism occurred in Chile in 1970-73 and in Argentina in 1973-75.

Another similarity among the four countries is their tendency to chronic economic instability. In the period 1960-85, these countries experienced fluctuating GDP growth rates, a varying but normally low share of domestic investment, widely fluctuating real exchange rates and persistent inflation. There were also some differences in degree of instability. Colombia does not have a history of high inflation and has not experienced declines in aggregate economic activity or fiscal imbalances comparable to those in the other three countries. Argentina, on the other hand, had by far the most extreme degree of economic (as well as political) instability.

During the 1970s, the four countries tried to develop more outward-oriented economies. They also attempted to reduce the size of the public sector, thereby eliminating a source of inflation and intervention in the economy. This reform effort was notable in the Southern Cone countries, particularly in Chile. To varying extents but following a similar philosophy,

these countries pursued trade liberalization, market deregulation, and financial liberalization, along with stabilization programs based on demand management and the use of exchange rate policies to reduce inflation (Edwards and Cox-Edwards 1988, Corbo and de Melo 1987). Despite these efforts, overvaluation of the real exchange rate, persistent fiscal disequilibrium, and too rapid a relaxation of capital account restrictions produced unsustainable trade deficits and external debt burdens (Barandiaran 1988).

In 1983-84, the reduction in domestic expenditures was substantial in all the countries but Colombia, and devaluations played a key role in the adjustment process. Since then, the adjustment process has been slow and the four countries experienced varying degrees of success. Chile and Colombia experienced a more sustained recovery than Argentina and Uruguay.

The four countries also share some common labor market characteristics. Government intervention in wage setting is important in all four countries. In Chile and Argentina, intervention occurs through indexation although there have been some discontinuities in this policy in Chile. In Uruguay, the government intervenes in wage bargaining carried out at the national level, thereby influencing the wage structure in the formal sector. In Colombia, intervention takes place mostly through nonwage cost regulations (World Bank 1985). In all four countries, wage intervention is also accomplished through minimum wage policies. While real minimum wages have declined in the Southern Cone countries, the ratio of minimum wage to unskilled wages has not, and this is a more relevant indicator of the labor market role of minimum wages.

Public sector employment policies have been used in these countries to absorb the growth in the labor force that the economy is unable to handle. The proportion of public sector employment to total employment is similar in the three Southern Cone countries. This ratio has steadily increased over time in

Colombia, but has recently declined in the other countries. That public sector employment has been used as a buffer for the slow growth of private sector employment is clearly suggested by the growth in public employment in Uruguay and Argentina, but is less marked in Colombia.

PRE Working Paper Series

	Title	Author	Date	Contact for paper
WPS469	Modeling Economic Behavior in Peru's Informal Urban Retail Sector	J. Barry Smith Morton Stelcner	August 1990	M. Abundo 36820
WPS470	What Do Alternative Measures of Comparative Advantage Reveal About the Composition of Developing Countries' Exports?	Alexander J. Yeats	August 1990	J. Epps 33710
WPS471	The Determinants of Farm Investment and Residential Construction in Post-Reform China	Gershon Feder Lawrence J. Lau Justin Lin Xiaopeng Luo	August 1990	C. Spooner 30464
WPS472	Gains in the Education of Peruvian Women, 1940 to 1980	Elizabeth M. King Rosemary Bellew	August 1990	C. Cristobal 33640
WPS473	Adjustment, Investment, and the Real Exchange Rate in Developing Countries	Riccardo Faini Jaime de Melo	August 1990	R. Sugui 37951
WPS474	Methods for Measuring the Effect of Adjustment Policies on Income Distribution	Anne Maasland	August 1990	P. Dixon 39175
WPS475	Does Divestiture Matter? A Framework for Learning from Experience	Ahmed Galal	August 1990	G. Orraca-Tetteh 37646
WPS476	Health Insurance in Sub-Saharan Africa: A Survey and Analysis	Ronald J. Vogel	August 1990	K. Brown 35073
WPS477	Private Participation in the Delivery of Guinea's Water Supply Services	Thelma A. Triche	August 1990	M. Dhokai 33970
WPS478	Interrelations Among Child Mortality, Breastfeeding, and Fertility in Egypt, 1975-80	John Marcotte John B. Casterline	August 1990	S. Cochrane 33222
WPS479	Conversion Factors: A Discussion of Alternate Rates and Corresponding Weights	Michael Hee	August 1990	E. Zamora 33706
WPS480	An Evaluation of Neutral Trade Policy Incentives Under Increasing Returns to Scale	Jaime de Melo David Roland-Holst	August 1990	R. Sugui 37951
WPS481	The Effects of Trade Reforms on Scale and Technical Efficiency: New Evidence from Chile	James Tybout Jaime de Melo Vittorio Corbo	August 1990	R. Sugui 37951
WPS482	Membership in the CFA Zone: Odyssean Journey or Trojan Horse?	Shantayanan Devarajan Jaime de Melo	August 1990	R. Sugui 37951

PRE Working Paper Series

	Title	Author	Date	Contact for paper
WPS483	An Evaluation of the Main Elements in the Leading Proposals to Phase Out the Multi-Fibre Arrangement	Refik Erzan Paula Holmes	August 1990	G. Ilogon 33732
WPS484	Stock Markets, Growth, and Policy	Ross Levine	August 1990	R. Levine 39175
WPS485	Do Labor Market Distortions Cause Overvaluation and Rigidity of the Real Exchange Rate?	Ramón Lopez Luis Riveros	August 1990	R. Luz 34303